

## CLAIMS

1. A heat-resistive catalyst comprising:

5       a composite particle comprising a noble metal particle,  
and a co-catalytic metal compound particle contacting as a metal  
with the noble metal particle; and

          a substrate carrying the noble metal particle and the  
co-catalytic metal compound particle.

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2. A heat-resistive catalyst comprising:

          a composite particle comprising a noble metal particle,  
and a co-catalytic metal compound particle contacting as an oxide  
with the noble metal particle; and

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          a substrate carrying the noble metal particle and the  
co-catalytic metal compound particle.

3. The heat-resistive catalyst as claimed in claim 1, wherein  
the co-catalytic metal compound particle comprises a transition  
20 metal compound.

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4. The heat-resistive catalyst as claimed in claim 2, wherein  
the co-catalytic metal compound particle comprises one of a rare  
earth element compound and a compound containing Zr.

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5. The heat-resistive catalyst as claimed in claim 1 or 2, wherein  
the substrate comprises a porous oxide having a surface carrying  
the composite particle.

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6. The heat-resistive catalyst as claimed in claim 1 or 2, wherein

the substrate comprises at least one porous oxide selected from among an alumina, a cerium oxide, a titanium oxide, a zirconia, and a silica.

5 7. The heat-resistive catalyst as claimed in claim 1 or 2, wherein the noble metal particle comprises at least one metal selected from among Ru, Rh, Pd, Ag, Ir, Pt, and Au.

10 8. The heat-resistive catalyst as claimed in claim 1 or 2, wherein the co-catalytic metal compound particle comprises a transition metal compound containing at least one transition metal selected from among Fe, Co, Ni, Cu, Ti, and W.

15 9. A production method of heat-resistive catalyst, comprising:  
having a noble metal salt aqueous solution and a co-catalytic metal salt aqueous solution concurrently provided in a reverse micelle,

preparing reverse micellar solution containing a noble metal precursor and a co-catalytic metal precursor; and  
20 having a substrate carrying a composite particle comprising the noble metal precursor and the co-catalytic metal precursor concurrently reduced as a noble metal particle and a co-catalytic metal particle, respectively.

25 10. The production method of heat-resistive catalyst as claimed in claim 9, comprising providing a reductant to the emulsion, concurrently reducing the noble metal precursor and the co-catalytic metal precursor in the reverse micelle, forming the composite particle.

11. The production method of heat-resistive catalyst as claimed in claim 9, comprising:

mixing, in the reverse micelle, a hydrolyzate of alkoxide as a precursor of a porous oxide forming the substrate, having  
5 a mixture; and

firing the mixture, before carrying the composite particle by a surface of the porous oxide.

12. The production method of heat-resistive catalyst as claimed  
10 in claim 9, comprising mixing, in the reverse micelle, an aqueous solution of a precursor salt of a porous oxide forming the substrate and a precipitating agent or an insolubilizing agent for precipitating or insolubilizing the precursor salt of the porous oxide as a hydroxide, before a firing to carry  
15 the composite particle by a surface of the porous oxide.

13. The production method of heat-resistive catalyst as claimed in claim 9, comprising dispersing, in the emulsion, powder of a porous oxide forming the substrate, before a firing to carry  
20 the composite particle by a surface of the porous oxide.

14. The production method of heat-resistive catalyst as claimed in claim 9, wherein the noble metal salt aqueous solution comprises a metal salt aqueous solution of at least one metal  
25 selected from among Ru, Rh, Pd, Ag, Ir, Pt, and Au.

15. The production method of heat-resistive catalyst as claimed in claim 9, wherein the co-catalytic metal salt aqueous solution comprises a metal salt aqueous solution of at least one metal  
30 selected from among Fe, Co, Ni, Cu, Ce, Zr, La, Ti and W.

16. The production method of heat-resistive catalyst as claimed  
in claim 9, wherein the substrate comprises a porous oxide  
containing at least one oxide selected from among an alumina,  
5 a cerium oxide, a titanium oxide, a zirconia, and a silica.